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Studies in *Sisyrinchium*—VIII : *Sisyrinchium Californicum* and Related Species of the Neglected Genus *Hydastylus*

BY EUGENE P. BICKNELL

The well-known *Sisyrinchium Californicum* of Aiton's Hortus Kewensis has rested for so long undisturbed in the genus *Sisyrinchium* that some fault of iconoclasm would seem to attend its removal from its time-honored place. Nevertheless the generic misfit of the plant in *Sisyrinchium* was long ago apprehended and a separate genus was created for it by Salisbury on the suggestion of Dryander (Trans. Hort. Soc. 1 : 310. 1812). This genus, *Hydastylus*, adequately founded as I do not doubt, appears to have missed the sanction of any later systematist.

The species was first brought to notice by Archibald Menzies who imported it into England for cultivation in 1796. Ten years later it was described and figured by Ker-Gawl as *Marica Californica* (Bot. Mag. t. 983, 180?), a disposition of the plant manifestly having regard for family relationship rather than generic affinity.

In 1812 Aiton, or Dryander, it may be, with clearer view transferred it to *Sisyrinchium*. The same year Dryander and Salisbury reached a truer conception of the plant's separateness of structure from *Sisyrinchium*, and their genus *Hydastylus* must now be revived to accommodate not this plant alone but also a well-defined generic group of yellow-flowered species of which it is the type.

The genus *Hydastylus* may be thus characterized :

Annual or perennial herbs with the habit and appearance of *Sisyrinchium*, but usually only imperfectly caespitose, discoloring or turning black in drying, most or all of the species staining purple under appropriate conditions ; rootstocks usually obscure or poorly developed, the delicate roots pale and slender. Leaves narrowly linear, the conduplicate bases more or less membranously expanded : stems ancipital, simple and scapose, terminated by a spathe of two conduplicate bracts enclosing membranous scales ; pedicels slender, often long-exserted, straight or finally recurved : perianth yellow, the mostly narrowed segments black-lineate or with brown

or orange veins, obtuse or acute but not aristulate nor emarginate; filaments more or less adherent below but commonly free nearly to the base or at least for more than half their length, somewhat spreading above; anthers narrowly linear, versatile; style-branches slender, divergent: capsule oblong to globose or pyriform, more or less trigonous, three-celled, many- or few-seeded: seeds rounded, distinctly pitted, widely umbilicate or acetabuliform.

Western North American from Vancouver to Lower California and at least to southern Mexico, extending east to Arizona and Coahuila.

The most evident points of difference between this genus and *Sisyrinchium* reside in the flowers and consist of partially free filaments, linear versatile anthers and slender spreading style-branches, together with yellow perianth, the lineate segments never aristulate nor emarginate and strictly glabrous ovary. In addition there is some indefinable foliar attribute which with more or less clearness announces the genus quite apart from the flowers. In fact two of the species here described are confidently referred to the genus although the flowers are unknown.

It will doubtless be found to be in accordance with the alignment of nature to limit the genus *Sisyrinchium* by the characters of tubular-united filaments, short erect anthers, undivided style and, with rare exceptions, blue, violet or white flowers, with the perianth segments aristulate or acutely pointed; furthermore the ovary is puberulent in the majority of species.

This understanding of the genus will exclude from it a number of South American species which it has hitherto been held to embrace and make necessary the formation of still other genera, but this, I fully believe, will prove to be the only logical treatment of the group. There might have seemed little reason for this view under the long-established belief that the genus in North America was at best a most insignificant one but now that its numerical importance has disclosed itself the beautiful homogeneity of the species of the blue-flowered section becomes in itself very suggestive and bears strongly against the congeneric equivalent with their group of the heterogeneous assemblage of species that have been included within it.

On this view *Sisyrinchium* proper is primarily a North American genus which though well-represented in South America has there a much less extensive representation than has been accorded it.

Of the genus *Hydastylus* it should be said that it may require to be more broadly interpreted in order to accommodate certain branched and yellow-flowered South American species which have yet to be made a subject of critical study.

Key to the Species of *Hydastylus*

- Flowers large; perianth 12-18 mm. long; leaves 2-7 mm. wide, mostly turning very dark when dry.
- Flowers large; pedicels mostly longer than the bracts, 20-40 mm. long; seeds 1.25-1.5 mm. in diameter. 1. *H. Californicus*.
- Flowers smaller; pedicels mostly shorter than the bracts, 10-20 mm. long; seeds .75-1 mm. in diameter. 3. *H. brachypus*.
- Flowers small to medium sized, 6-12 mm. long; leaves mostly 1-3 mm. wide, not usually turning very dark; pedicels not recurved.
- Anthers small, 2-2.5 mm. long.
- Pedicels little longer than the bracts, erect; perianth 8-10 mm. long. 2. *H. borealis*.
- Pedicels slenderly exserted, somewhat spreading; perianth 6-8 mm. long. 5. *H. rivularis*.
- Anthers larger, 3-5 mm. long.
- Pedicels more or less exserted, erect; perianth 8-12 mm. long. 4. *H. Elmeri*.
- Pedicels long-exserted, closely erect; plant slender, 15-30 cm. high; perianth 8-12 mm. long. 6. *H. longipes*.
- Pedicels long-exserted, somewhat spreading; plant low or depressed; leaves 1.5-2 mm. wide. 7. *H. parvus*.
- Pedicels exserted; plant low or depressed; leaves .05-1.5 mm. wide. 8. *H. Schaffneri*.
- Flowers very small, 3-5 mm. long; pedicels recurved-spreading; capsules 3-6 mm. long.
- Outer bract much prolonged; anthers 1 mm. long. 9. *H. cernuus*.
- Bracts subequal; anthers 3-5 mm. long. 10. *H. subcernuus*.
- Flowers unknown; leaves very thin; capsules 6-10 mm. long.
- Capsules large, 8-10 mm. long, pyriform; leaves and stem 2-5 mm. wide, serrulate; pedicels flexuous. 11. *H. serrulatus*.
- Capsules 6-7 mm. long, obovoid-oblong; leaves and stem narrower, not serrulate; pedicels spreading or recurved. 12. *H. translucens*.

HYDASTYLUS CALIFORNICUS (Ker.) Salisb. Trans. Hort. Soc. 1: 310. 1812.

Marica Californica Ker-Gawl. Bot. Mag. t. 983. 1806.

Sisyrinchium Californicum Hort. Kew. ed. 2, IV.: 135. 1812.

Sisyrinchium lineatum Torrey, Pac. R. R. Rep. IV., 143. 1857.

Sisyrinchium flavidum Kellogg, Proc. Cal. Acad. II.: 50. t. 3. 1863.

Mostly 20-30 cm. high (15-60 cm.), dull green and glauces-

cent, turning dark or often quite black on the herbarium sheet and readily staining a deep purple, roots spreading from a weak descending rootstock. Leaves thin and rather openly weak-nerved, mostly about half the height of the stem but sometimes equaling it, obtusely pointed, commonly 2-4 mm. wide (1.5-7 mm.): stem usually 2-3 mm. wide, sometimes broadly wing-flattened and becoming 6 mm. wide, the edges like those of the leaves smooth or obscurely serrulate-roughened: spathes erect, 3-8 mm. wide in pressed specimens; outer bract 20-52 cm. long, narrowed to an obtuse point, occasionally subequal with the inner one but usually slightly surpassing it and sometimes as much as 20 mm. longer, the margins below narrowly hyaline, often purplish, united-clasping for 5-10 mm.; inner bract 20-35 mm. long, white-scarious and obtuse or obtusely pointed at the apex; interior scales brownish hyaline, often slightly exserted: flowers 3-7, on erect pedicels 20-40 mm. long, usually a little surpassing the bracts, at least the inner ones, and sometimes exserted as much as 10 mm.; perianth bright yellow, 12-18 mm. long, the oblong obtuse or acutish segments with 5-7 black or dark brown nerves which often become tortuous or crinkled when dry: stamens about 7 mm. high, subequal with or surpassing the style branches, the narrow versatile anthers orange-yellow, 3.5-5 mm. long: capsules on erect pedicels, at maturity 7.5-12 mm. long, 6-8 mm. wide, trigonous-obovoid or ellipsoid, becoming very dark: seeds numerous, 1.25-1.5 mm. in diameter, black, strongly pitted, excavated-umbilicate.

Coast region of California, in marshes, perhaps exclusively within maritime influence, from San Diego to Mendocino County, flowering from April to June.

SAN DIEGO, Pac. R. R. Rept. l. c.

MONTEREY Co., C. C. Parry, M.D., April, 1850, in full flower, type of *S. lineatum* Torrey; Mrs. Rich, on sheet with type; Herb. Columbia.

Near the 35th parallel, Dr. J. M. Bigelow, Whipple's expedition, 1853-4.

CONTRA COSTA Co., Antioch, Dr. A. Kellogg, April 21, 1870, just in flower.

SAN FRANCISCO, Mrs. Brandege; Kellogg and G. W. Harford, 1868; Kellogg, 1866; Presidio, 1887, Edward L. Greene.

SAN MATEO Co., Crystal Springs, April, 1896, Miss Alice Eastwood.

SONOMA Co., Michener and Bioletti, 1892; Bodega Point, Eastwood.

MENDOCINO Co., Bolander, 1866; Eastwood, 1894; H. E. Brown, 1898.

Specimens from "California" have also been examined, collected by Dr. Gibbons (1853), Dr. Coulter and E. Hall.

IRELAND, near Wexford, Rev. E. S. Marshall, June, 1896, fide A. B. Rendle, Journ. Bot. XXXIV., 494.

Numerous specimens covering the extended range of this plant of at least seven hundred miles along the California coast show a great amount of variation and give indications apparently little less than conclusive of two closely allied species within the region.

The type locality of *H. Californicus* is stated to be "Port Bodega" (A. B. Rendle, l. c.), from whence specimens were taken to England over a century ago. Recent collections by Miss Alice Eastwood, made at Bodega Point, Sonoma County, presumably the type locality, are of the form which has been most frequently collected and which shows certain rather suggestive differences from the type specimens of Torrey's *S. lineatum*. As a rule this more northern plant is taller and less discolored from drying with longer and thinner often broader leaves and longer spathes having the outer bract often considerably prolonged, flowers larger, apparently more delicately veined and with the segments less broadened toward the apex, and longer anthers. Present material is not conclusive as to the exact relationship of these two forms, but it would seem that Torrey's specimens may represent a closely allied species of more southern range extending from San Diego to San Francisco, the true *H. Californicus* perhaps not ranging far south of San Francisco. It may be now impossible to determine from Kellogg's description of his *S. flavidum* to which of these plants his name implies. It may be noted, however, that in the Herbarium of the California Academy of Science are two sheets of the more northern plant labelled in pencil "*S. aureum* Kellogg" and another sheet bearing specimens of both plants with penciled memoranda noting their differences. It would appear that these were part of Kellogg's material and since they bear date some years later than the publication of his *S. flavidum* the inference is that he regarded his *S. aureum* as distinct from the latter which would thus be shown to be identical with Torrey's *S. lineatum*.

A somewhat distinct appearing form of the plant which would seem to belong with true *H. Californicus* if two species are ever to be distinguished is indicated by the specimens collected by Dr. Bigelow on Lieutenant Whipple's expedition of 1853-4. These are remarkable for their low stature as compared with their broad leaves and stems, which are 3-6 mm. wide, and their stout spathes; the broad thin wings are notably broadened towards the top of the stem but abruptly contracted at the spathe as in *H. brachypus*, described beyond, but unlike the latter the flowers are of the largest size, becoming 18 mm. long, on slightly exserted pedicels, and the spathes are much larger with the outer bract more united-clasping and the inner one less obtuse.

Quite an opposite extreme of development is shown by specimens from Sonoma Co. collected by Michener and Bioletti. These are remarkably tall and slender with short spathes and decidedly exserted pedicels.

***Hydastylus borealis* sp. nov.**

Very close to *H. Californicus* but ordinarily much smaller and more slender, with spathes and flowers about one half the size, much smaller stamineal-column and anthers, smaller capsules and decidedly smaller seeds.

Commonly 15 cm. high (6-30 cm.) not usually turning very dark in drying and when young showing little discoloration; roots usually more slender and delicate than in *H. Californicus*, often much elongated. Leaves commonly only 1-3 mm. wide, rarely 4 mm., often with abruptly linear tip, sometimes even almost subcaudate; stem usually narrower than the leaves: spathe stiffly erect, the inner bract 12-18 mm. long, slightly surpassed by the outer one which is less united-clasping than in *H. Californicus*—usually only 3-4 mm.: flowers on closely erect slightly exserted pedicels 15-22 mm. long; perianth yellow, 8-10 mm. long, the segments apparently mostly five-nerved: stamens 5-6 mm. high, the anthers small, 2-2.5 mm. long: styles 2.5-3 mm. long: capsules ellipsoid, 6-8 mm. long or sometimes narrower obovoid-oblong, and a little longer, 3.5-6 mm. wide: seeds .75-1 mm. in diameter, globose, excavated on one side, finely pitted, often of a semi-transparent reddish color.

Vancouver Island to Whatcom County, Washington, growing on shores of fresh water lakes and flowering from early in July

until after the middle of August. Professor Macoun writes "It grows always in soft mud on the margins of fresh water lakes away from the coast."

WASHINGTON: Whatcom Co., W. N. Suksdorf, flowers July 7; fruit August.

VANCOUVER ISLAND: Lake shores, July 1, 1887, first flowers, and Shawnigan Lake, July 12, 1887, John Macoun; Shawnigan Lake, Aug. 18, 1897, fruit and last flowers, Wm. N. Canby; Sooke, Aug. 3, 1893, John Macoun, fruit and last flowers.

The very close affinity of this plant to *H. Californicus* is much more apparent than its diversity; nevertheless, its much smaller average size throughout and especially its smaller flowers, short anthers and small seeds, taken in connection with its inland distribution and lacustrine habits, is certainly sufficient evidence that it cannot be regarded as the same. The question of varietal relationship in cases such as this must always of course, remain merely a matter of conjecture in the absence of conclusive proof.

The present case is almost fatally complicated by the existence in the coast region of Washington and Oregon of yet another form even more closely related to *H. Californicus*. In a way this plant is intermediate between the two but I cannot conscientiously escape the difficulty it presents by referring it to either, nor do I know how to treat it as a variety; neither can it be ignored. The only consistent course therefore is to give it recognition as a closely allied species, even though its entire validity remains to be established. It may therefore be called to notice as *Hydastylus brachypus*.

***Hydastylus brachypus* sp. nov.**

Mostly low and stout, 8–15 cm. high, but becoming twice as tall, leaves and stem broad, 2–5 mm. wide, sometimes narrower, commonly becoming very dark in drying, the leaves abrupt at the apex or short acuminate, mostly obtusely pointed, the stem often very broadly thin-winged, and abruptly contracted below the spathe; roots very slender and delicate: spathes short, the inner bract 15–20 mm. long, mostly broad above and obtusely rounded and scarious at the apex; outer bract abruptly narrowed to an obtuse point, subequal with or but slightly surpassing the inner one, the broad base rather loosely short-clasping for 2–5 mm., the lower margins conspicuously white or purplish-hyaline; interior

scales ample, usually slightly exserted : flowers apparently medium sized, the anthers 3–4 mm. long : capsules oblong to broadly ellipsoid, 7–10 mm. long, at maturity crowded together on short pedicels mostly 10–15 mm. long, on large plants becoming 20 mm. long, mostly much shorter than the bracts : seeds black, distinctly pitted and umbilicate, small, .75–1 mm. in diameter.

Coast region of Oregon and Washington. Flowering in June and July.

OREGON: Elihu Hall, 1871; Newport, A. Isabel Mulford, June 1, 1892.

WASHINGTON: Near Gray's Harbor, Wilke's Expedition, 1838–42; Chehalis Co., July 6, 1897, F. H. Lamb; Estuary of the Columbia, Nuttall; low hills of the Columbia, Dr. Scouler.

Very near indeed to *H. Californicus* and often equally stout, but mostly lower, with shorter spathes, broader and less unequal bracts, the inner one more obtuse, smaller flowers, very much shorter pedicels and smaller capsules and seeds.

The plant is mostly much stouter than *H. borealis* with broader and more obtuse leaves and bracts and dries darker; the flowers and capsules are rather larger, although the seeds appear to be equally small; in the specimens examined the seeds are darker, less finely pitted and less widely umbilicate, except in size agreeing more nearly with those of *H. Californicus*. Although a larger plant than *H. borealis*, the pedicels, which are relatively much shorter, are in most specimens absolutely so, say 10–15 mm. as against 15–20 mm.

The exact status of the plant can probably be determined only by critical comparative study in the field.

***Hydastylus Elmeri* (Greene).**

Sisyrrinchium Elmeri Greene, Pittonia, 2: 106. 1890.

Nearly allied to *H. Californicus* but smaller and especially more slender, 15–30 cm. high, not turning dark unless carelessly dried. Leaves half the height of the stem or less, 1–3.5 mm. wide: stems very slender, .75–1.5 mm., rarely 2 mm. wide, very narrowly winged or merely margined, like the leaves sometimes minutely serrulate; bracts of the spathe subequal or the outer one slightly the longer, 16–25 mm. long and united-clasping for mostly 5–6 mm., narrowed or short-attenuate to an obtuse point, the rather narrow inner bract scarious obtuse: flowers yellow,

rather closely 5-7-nerved; perianth 10-12 mm. long: stamens 5-7 mm. high: anthers as long as in *H. Californicus* or nearly so, usually 4-5 mm. long; pedicels very slender, 18-23 mm. long, erectly exserted for 1-6 mm.: fruit unknown.

A plant of the Sierra Nevada from northern to middle California, representing there the much larger and stouter *H. Californicus* of the coast.

Though clearly an excellent species as recognized by Professor Greene it can be but poorly understood from existing material. As compared with *H. borealis* it is decidedly more slender with relatively shorter leaves, narrower bracts, longer anthers and more exserted pedicels.

CALIFORNIA: Sierra Nevada, June 28, 1889, Elmer Drew; Type in Herb. Prof. E. L. Greene; Plumas Co., 1876, Mrs. R. M. Austin; Mrs. Ames; Indian Valley, J. G. Lemmon; American Valley, May, 1879, Miss M. A. Plumer.

***Hydastylus rivularis* sp. nov.**

Very small, 3-10 cm. or even 15 cm. high, becoming dull but not turning black in drying, the roots very slender and delicate. Leaves ascending and erect in a short basal tuft, the longer ones 2-6 mm. long, .05-1.5 mm. rarely 3 mm. wide, faintly few-nerved, rather abruptly obtuse, the translucent extreme edges like those of the stem crenulately uneven under a lens; stem straight or out-curved, .05-1 mm. or even 1.5 mm. wide, distinctly thin-winged: spathes straight or deflected, very small, the inner bract 12-17 mm. long, usually surpassing the outer one, the scarious-margined tip obtuse or acutish; outer bract narrowed to an obtuse tip, united-clasping below for 3-6 mm.; interior scales subequal with the bracts, dark-lineate: flowers few, 1-3, on capillary loosely erect or flexuously spreading, much exserted pedicels 15-23 mm. long, surpassing the bracts 5-10 mm., sometimes even twice their length: perianth orange-yellow, 6-8 mm. long, the segments oblong, obtusely pointed, rather openly 5-nerved: stamens 3-5 mm. high, the anthers very small, 2-2.5 mm. long, about the length of the style-branches: seeds apparently few and relatively large.

CALIFORNIA: Fresno Co., Ford of Bubb's Creek, July 5, 1899, in full flower, Miss Alice Eastwood; Mariposa Co., June 3, 1883, J. W. Congdon, first flowers; Eldorado Co., July 13, 1897, first flowers, Ezra Brainerd, wet rocks near Slippery Ford, altitude, 6000 feet.

A diminutive and very delicate plant growing in the wet and sandy or stony margins of fords of mountain streams, and apparently confined to the Sierra Nevadas of middle California.

Its affinity is with *H. Elmeri* and reduced examples of the latter approach it closely, but a wide difference appears between fully developed specimens of the two plants. The very much smaller size and shorter narrower leaves of more delicate texture, the small spathes with elongated inner bract, the small flowers with less close-veined segments, small anthers and mostly flexuously long-exserted pedicels afford a combination of characters which I cannot reconcile with what appear to be the normal characters of *H. Elmeri*.

The species is not unlike the smallest examples of *H. borealis* which, however, is normally altogether larger and stouter, with longer and much broader and more acute leaves, larger spathes and flowers, the outer bract the longer, and but little exserted pedicels.

***Hydastylus longipes* sp. nov.**

Pale dull green and glaucescent, not turning dark when dry, from 15 to 30 cm. high, often in narrow tufts. Leaves numerous, mostly about half the height of the stem, closely erect, rather thin, 1-3 mm. wide, narrowed to an obtuse or acutish usually slightly bent point, the almost hyaline edges smooth: stems from less than 1 mm. to 2.5 mm. wide, the narrow wings smooth-edged: spathes sometimes slightly purplish, rather narrow, 1.5-3 mm. wide, erect or a little bent: bracts thin, often only obscurely nerved, outer one 1.7-2.5 cm. long, connate below for 4-6 mm., narrowly hyaline above to the narrowed and obtusely-pointed tip which surpasses the inner bract 2-6 mm.: inner bract much enclosed, the tip white-scarious and obtuse: longer interior scales equaling the inner bract or nearly so: flowers 3-6 on slender, erect, much exserted pedicels 2-3.8 cm. long, sometimes twice the length of the spathes: perianth 8-12 mm. long, apparently orange-yellow, the segments with fine orange or brownish veins, narrowly oblong, rounded or obtusely pointed at apex: stamens 6-7 mm. high, anthers about 4 mm. long: capsules broadly oblong or obovoid-oblong, slightly retuse, 5-7 mm. high, 4-5 mm. wide, thin-walled, turning dark, erect and contiguous: nearly mature seeds irregularly obovoid or subglobose, 1 mm. in diameter, umbilicate, rugulose pitted.

High mountains of Arizona and northern Mexico, flowering from early July until after the middle of August.

ARIZONA: San Francisco mountain, Aug. 18, 1889, fruit and last flowers, F. H. Knowlton; Aug. 4, 1898, 9000–10,000 ft. in meadows, Dr. D. T. MacDougal; Rincon Mts., 7500 ft., 1891, G. C. Neally; Harts Little Spring, July 14, 1892, full flower, E. O. Wooton; J. W. Toumey.

MEXICO: Chihuahua, Sierre Madre, 7500 ft., July 18, 1899, full flower; communicated by Prof. E. O. Wooton.

The aspect of this plant is nearest that of *H. Elmeri* but it is more tufted and leafy with rather broader stem but narrower leaves, rather more prolonged and narrower outer bract, much more exserted pedicels apparently also with less closely and distinctly lineate perianth segments and somewhat shorter anthers.

Hydastylus Schaffneri (Watson)

Sisyrinchium Schaffneri Watson, Proc. Am. Acad. 18: 160. 1883.

Low, in erect or somewhat depressed leafy tufts, 4–10 cm. high, from short rootstocks bearing pale and apparently soft and somewhat thickened simple roots, dull green, discoloring when dry. Leaves equaling the stems or shorter, very narrow, 0.5–1.5 mm. wide, rather abruptly membranously expanded to a relatively long conduplicate base, narrowed to a very obtuse sub-cartilaginous tip, apparently thickish, the rather obscure fine nerves becoming somewhat prominent in drying, the intervals minutely cross-rugulose or even subscabrellous, the edges smooth or nearly so: stems erect or spreading, narrowly wing-margined, .05–1 mm. wide, rugulose like the leaves and smooth edged or nearly so: spathes mostly deflected, small, 10–15 mm. long, 1.5–2 mm. wide, the bracts subequal or usually the outer one slightly the longer; rugulose, the outer one attenuate to an obtuse tip or sometimes more abruptly narrowed, united-clasping for 3–5 mm., the margins below narrowly hyaline: inner bract less narrowed, scarious obtuse at apex: interior scales subequal with the bracts: flowers few, 3–5, on slenderly exserted, erect or sub-spreading pedicels 15–23 mm. long, exserted 5–8 mm.: perianth yellow, distinctly lineate, about 6–8 mm. long: anthers 2.5–3 mm. long.

Central Mexico, San Luis Potosi, 6000–8000 ft. altitude, no. 881, C. C. Parry and Ed. Palmer, 1878, no. 527, Shaffner.

I have examined three sheets of this type material, two of no. 881. It does not appear that the plant has since been collected.

Hydastylus parvus sp. nov.

Similar to *H. Schaffneri* (Watson) of Mexico, but with broader leaves and stem and larger spathes, the flowers on more exserted pedicels and larger with longer anthers.

Leaves shorter than the stems, mostly 1.5–2 mm. or even 2.5 mm. wide, apparently thinner and rather more distantly nerved than in *H. Schaffneri* and only obscurely if at all rugulose: stem 1.5–2 mm. wide, wing-flattened: spathes 13–18 mm. long, distinctly broader than in *H. Schaffneri*, 2.5–3 mm. wide, the bracts subequal, but often the inner one slightly the longer, the outer one rather more loosely united-clasping than in *H. Schaffneri* and less attenuate, the inner one broader above and more scarious-obtuse; pedicels 23–28 mm. long, usually becoming nearly twice the length of the bracts, erect or diverging: perianth 7–10 mm. long; anthers 3.5–5 mm. long.

MEXICO: "low valley near Saltillo, March 22, 1847, no. 340, Dr. Gregg" just in flower. Type in Herb. Miss. Bot. Gard. and Herb. Columbia.

Hydastylus cernuus sp. nov.

Caespitose in small open tufts 7–18 cm. high from a cluster of pale and delicate fibrillate roots, dull green and glaucescent, turning brown or blackish when dry. Leaves membranously equitant at base, sometimes equaling the stems but mostly shorter, very thin with delicate rather distant nerves often with a fainter alternating series, 1.5–4.5 mm. wide, acuminate to an obtusish point, sometimes obscurely roughened on the sides above, the almost hyaline edges smooth or minutely serrulate: stems erect or ascending, slender, .75–1 mm. wide, delicately wing-margined, the edges smooth to serrulate: spathes erect; outer bract much prolonged, mostly twice the length of the inner one or even longer and surpassing it 5–25 mm., 15–40 mm. long, attenuate to an obtuse point or foliaceously broadened and acuminate, united-clasping for about 5 mm. at base; inner bract 10–15 mm. long, narrow, acutish to obtuse, usually much concealed; interior scales narrow, shorter than the inner bract: flowers very small, 3–5 mm. long, pale yellow, the segments somewhat obtuse, dark-lineate: anthers linear, .05–1 mm. long, the stamens 1.5–2 mm. high: pedicels capillary, becoming 12–18 mm. long, finally slenderly exserted and recurved, the capsules mostly cernuous: capsules pale brown with very thin almost membranous walls taking the impression of the contained seeds, subglobose and 3–5 mm. high to somewhat pyriform and rather longer; seeds mostly 2–4 in each row, sometimes more,

large, 1.25–1.5 mm. in diameter, subglobose to broadly oblong, semi-transparent brown, deeply close-pitted and excavated-umbilicate.

MEXICO: Chihuahua; Sept. 7, 1887, fruit mature and last flowers; "High plains between Cusihiuriachic and Guerrero, C. G. Pringle; wet places, Sierra Madre, Oct. 11, 1888, fruit mature and last flowers," C. G. Pringle.

Printed labels refer the older collections of this plant to *H. Schaffneri* from which, however, it may be readily distinguished by much broader leaves, elongated primary bracts and much smaller flowers with very short anthers and recurved pedicels.

***Hydastylus subcernuus* sp. nov.**

Caespitose in small tufts, 6–15 cm. high, the leaves mostly erect, the stems erect or ascending, turning dark brown in drying; roots pale, very delicate and fibrillate. Leaves about half the height of the longer stems, mostly 1.5 mm. wide (1–2 mm.), thin and delicately open-nerved, tapering to an obtuse point, the edges smooth to distantly denticulate: stem 2–15 cm. high, .05–1.5 mm. wide, delicately wing-margined, the thin edges minutely denticulate or usually so: spathes small, the narrow bracts subequal or usually the outer one a little surpassing the inner, sometimes as much as 6 mm. longer, 13–22 mm. long, united-clasping for 5–6 mm., attenuate to an obtuse point; inner bract narrowly obtuse-pointed; interior scales nearly equaling the inner bract: flowers 3–5, small, perianth about 5 mm. long, yellow, delicately dark lineate: stamens about 3–50 mm. long; pedicels capillary, 15–20 mm. long, finally exserted and recurved spreading: capsules less membranous than in *H. cernuus* but similarly moulded over the contained seeds, mostly obovoid-pyriform and 5–6 mm. high: seeds few in a row, larger and rather darker and more coarsely pitted than in *H. cernuus*, 1.5–1.75 mm. in diameter, widely excavated on one side or more or less acetabuliform.

LOWER CALIFORNIA: Sierra de la Laguna, January 22, T. S. Brandege, type in Herb. Cal. Acad. Sci.

Nearly related to *H. cernuus*, but with narrower leaves, much shorter outer bract, larger flowers with much larger anthers, pedicels less exserted and recurved, capsules rather larger, seeds larger and more coarsely pitted and acetabuliform.

***Hydastylus serrulatus* sp. nov.**

Growing in nearly simple tufts, 14–32 cm. tall, from very deli-

cate and fibrillate nearly simple roots, rather bright transparent green, discoloring but little when carefully dried. Leaves acuminate to an acutish point, 2–5 mm. wide, thin and somewhat translucent, very delicately nerved, the main nerves rather distant with 1–3 fainter nerves in the intervals, rather distantly reticulated with minute cross-veinlets, the edges sharply fine-serrulate: stems 2–5 mm. wide, the stem proper very narrow, the wings very broad and thin, nerved and semi-transparent like the leaves and with serrulate edges: spathes mostly narrower than the stem: outer bract lanceolate-attenuate, 25–37 mm. long, surpassing the inner one 3–12 mm., united clasping 6–8 mm. at the flattened and sharply two-edged base: inner bract attenuate and acutish, 20–25 mm. long: interior scales more than three-quarters the length of the inner bract: capsules 3–6, large, pyriform, narrowed to an almost substipitate base, 8–10 mm. long, on slender, somewhat flexuously spreading pedicels about 25 mm. long: seeds black, subglobose, about 1.5 mm. in diameter, strongly pitted, excavated-umbilicate.

A species very distinct from any of the others here described, characterized especially by the very thin and reticulated semi-transparent leaves, broadly-winged stem and large pyriform capsules.

MEXICO: Orizaba, "in the mountains," Botteri, no. 1856. Type in Herb. Dr. Charles Mohr; Michoacan, 1857, Dr. Carlos Sartorius, Herb. Dr. Charles Mohr.

***Hydastylus translucens* sp. nov.**

Very similar to *H. serrulatus*: glaucescent, the spathes often purplish tinged, 15–25 cm. high, showing more or less discoloration from drying, leaves equaling the stems or nearly so, 2–3.5 mm. wide: as compared with those of *H. serrulatus* longer and narrower, much more slenderly attenuate and even thinner and more translucent, with fewer cross-veinlets, the edges not distinctly serrulate, but wholly smooth except near the apex, or with some very minute or obscure denticulations: stem 1–1.25 mm. wide, the very thin translucent wings much narrower than in *H. serrulatus* and smooth-edged or nearly so: spathes not narrower than the stems, usually somewhat broader, the outer bract usually foliaceously prolonged, 30–47 mm. long, surpassing the inner one 10–25 mm., united-clasping 8–10 mm. above the sharply two-edged base: inner bract 17–22 mm. long, narrow, obtuse or emarginate: interior scales longer than in *H. serrulatus*, equaling the inner bract or nearly so: pedicels very

slender and long-exserted, more or less spreading and finally recurved for about half their length, 25–37 mm. long : capsules 3–5, obovoid-oblong or somewhat pyriform, smaller and thinner-walled than in *H. serrulatus*, about 6–7 mm. long : seeds larger than in any other species of the genus at present known, 2–2.5 mm. in longer diameter, flattened acetabuliform, strongly reticulate-pitted.

LOWER CALIFORNIA, Sierra de la Lagura, January 24, some fruit mature. T. S. Brandege, Herb. Cal. Acad. Sci.

Closely related to *H. serrulatus*, *H. cernuus* and *H. subcernuus* but unmistakably a distinct species, as clearly shown by its much larger seeds, longer outer bract and longer pedicels without regard to other characters. These four plants form a group of closely related species constituting a section of the genus rather obviously distinct from the more northern group represented by *H. Californicus*. The group characters especially to be noted are very thin membranous leaves showing cross-reticulations between the nerves, although these are few or obsolete in *H. cernuus* and *H. subcernuus*, more or less spreading or recurved pedicels and very thin-walled, mostly pyriform capsules.